

CHANNEL ESTIMATION AND SYNCHRONIZATION WITH PREAMBLE USING POLYPHASE CODE

ABSTRACT

A preamble for an OFDM signal synchronizes (104) and estimates (106) the sub-channels with only one code. One polyphase code sequence is used repeatedly for the preamble. The preamble is spread out over the bandwidth, which is the same as an OFDM symbol in the frequency domain and has good autocorrelation characteristics in the time domain. All OFDM signals are added with this preamble at the beginning of the OFDM signal and transmitted on the channel at a transmitter (50). At the receiving end, the receiver (100) first does the autocorrelation process to find out a peak value for synchronization in the time domain. Then, since the polyphase code is known at the receiver, the signal to noise ratio for each sub-carrier is calculated in the frequency domain and smoothed using the normal (Gaussian) distribution to provide the channel estimation. Since the synchronization and channel estimation are processed with a single preamble, the overhead for these two functions is significantly reduced.